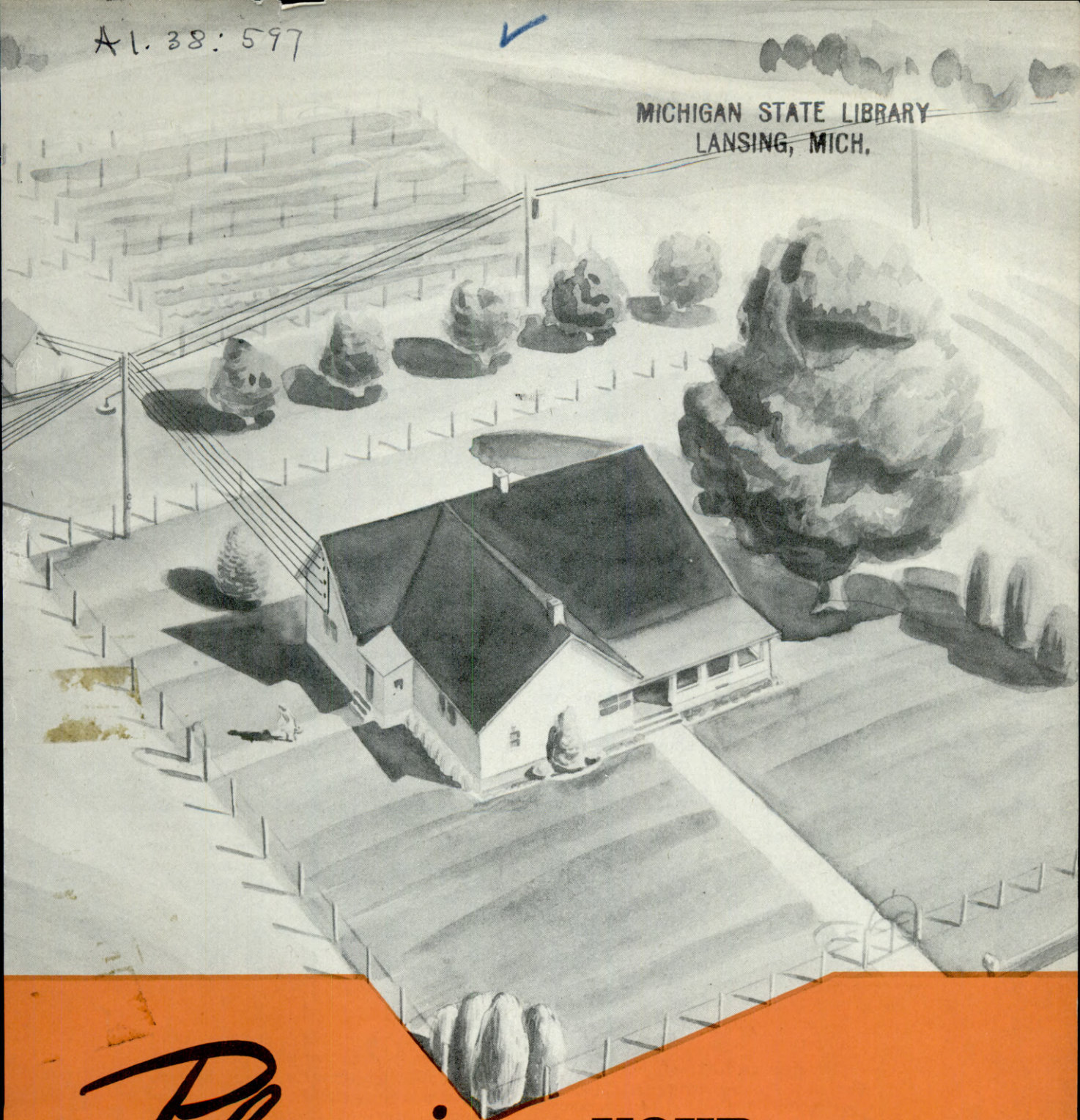


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Planning **YOUR FARMSTEAD WIRING AND LIGHTING**



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ELECTRICAL TERMS OFTEN USED

Here are a few everyday electrical terms with which you will want to become familiar. Understanding these terms will help you plan your wiring.

Ampere.—An ampere (current) is the rate at which a given quantity of electricity flows through a conductor or circuit. The term "ampere" is often abbreviated amp.

Volt.—A volt is the unit used in measuring the electrical pressure causing the current to flow. (Voltage is electric pressure.)

Watt.—A watt is a unit of electric power. ($1 \text{ volt} \times 1 \text{ ampere} = 1 \text{ watt}$.)

Kilowatt.—A kilowatt is 1,000 watts.

Horsepower.—A horsepower equals 746 watts.

Kilowatt-hour.—A kilowatt-hour is a kilowatt of power used for 1 hour. Electrical energy is metered and sold by the kilowatt-hour. It is often indicated kwh.

Circuit.—An electrical circuit consists of two or more conductors (wires) making a continuous path for the current to travel from the source of supply to the point where it is used, and return.

Branch circuit.—A branch circuit is that part of the wiring system extending beyond the last circuit breaker or fuse.

Circuit breaker.—A switch that opens automatically, stopping the flow of current when more electricity flows through the circuit than the circuit is capable of carrying.

Switch.—Just as a valve is used to control the flow of water in a pipe, a

switch is used to break or permit the flow of electric current in a circuit.

3-way switch.—A type of switch used to control a light from two points—as at the bottom and top of stairs, at the porch and garage, at house and barn, or at two entrances to a room.

Entrance switch.—A special switch for breaking the connection between the building wiring system and the wires leading from the yard pole.

Conductor.—A wire used for carrying electric current.

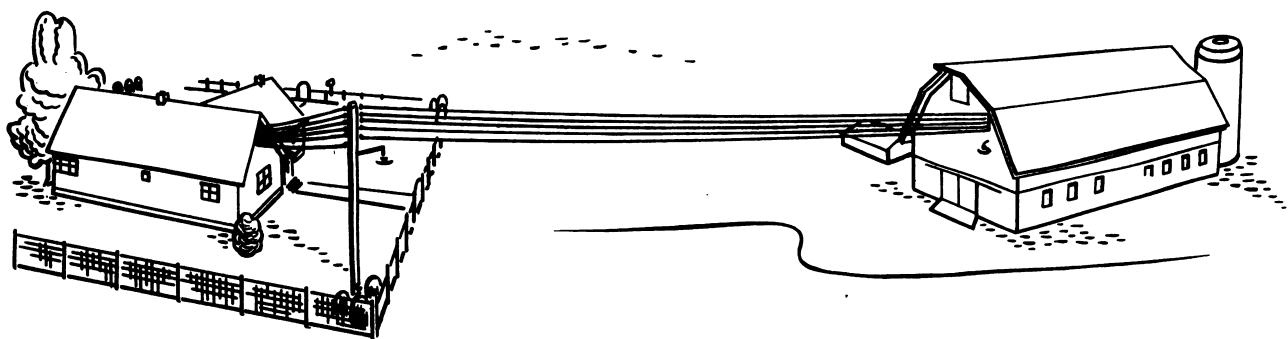
Fuse.—A device containing a piece of soft metal which melts and opens the circuit when the circuit is overloaded.

Grounding electrode.—An acceptable rod or pipe driven into moist earth, to which certain equipment and parts of the wiring system must be connected. Continuous underground water piping is sometimes acceptable as a grounding electrode.

Grounding conductor.—A conductor used to connect the equipment or wiring system with a grounding electrode.

Outlet.—An outlet is a point in a wiring system at which electric current is taken from the wires in the building to supply light fixtures, lamps, heaters, motors, or switches which control these or other current-consuming equipment. A convenience outlet is for use with equipment having extension cords and plugs.

Panelboard load center (or service entrance).—A cabinet in which one or more fuses or circuit breakers is enclosed, and to which final branch circuits are connected.



Planning Your Farmstead Wiring and Lighting

PLANNING the wiring of the farm and home is the first step in a new adventure for the entire family.

Electricity brings new ways of working and living to the farm. This book will help you to plan the type of wiring that will enable you to use electricity profitably and safely—to take fullest advantage of this wonderful tool. It will aid you in planning, not only for immediate but for future uses of electricity. All wiring should be planned that way.

However, it is not intended in this booklet to show you how to wire your farm. Wiring is a technical job requiring special knowledge, and data of a type not covered in these pages.

Here is how to use this book:

Read it from cover to cover.—Study the information carefully. Discuss plans with your family. You will see that the sketches and floor plans represent rooms in a farm home of common type, and buildings common to many farmsteads. You will find that the methods used in planning the wiring of the farm illustrated can be used on your own farm.

Next, consider your present and future needs for electricity.—It might be a good idea for you and your family to list all the electrical equipment which you will use in your home and on your farm as soon as you have it wired. Then, list as far as possible the additional equipment you plan to acquire during the next few years.

Your electricity is brought to you and distributed around your farmstead on wires of different sizes, depending upon the various uses to which you put power.

Unless you plan now for future uses of electricity—which are certain to come—you may find it necessary to rewire part or all of your farm with larger size wires and different circuit arrangements at considerable expense and trouble. Failure to rewire may cause motors to burn out, equipment to use more electricity and operate less satisfactorily than they

should. It may cause electrical trouble and even be extremely hazardous to your family, livestock, and property.

This is why looking ahead in wiring is very important. If it is impossible to install complete wiring now, that part which is put in should be installed in such a way that it can be added to, rather than torn out and replaced.

Remember, there are many uses for electricity in the home and on the farm. Make sure now that no matter how much electricity you use, and no matter how many pieces of equipment you may some day install, your wiring system will be adequate. It is cheaper and safer to plan early than to rewire later. Some farms have been rewired as many as two or three times within 10 years because of inadequate planning.

Study the drawings on each page.—First, examine carefully the floor plan of the house illustrated on page 5 and read the descriptive matter above it. Then take a ruled page from the book (one of pages 26 to 31) and on it lay out in outline the general plan of your home, room by room. Use the other ruled pages to do the same with your barn and other farm buildings.

Now you are ready to go on a tour of your home and outbuildings.—Compare the electrical uses which you are planning with those indicated in the sketches and floor plans. The sketches do not show room wiring. This is what they do show:

1. The orange panels by the doors in the sketches indicate switches controlling the central lighting fixtures and other electrical aids. The electrical path between the switch and the fixture is indicated by a line, which may or may not be the exact wiring you will need between these points. Remember that each room in every farmstead has its special wiring problems. Your task will be to place your fixtures where you want them—your wireman will connect them properly.

2. Orange panels placed elsewhere in the room or building sketch indicate possible location of various convenience outlets needed for full use of electricity in the home and on the farm.

It has been said that 95 percent of electrified homes in the United States do not have enough convenience outlets for present use, let alone for future needs. Too often, in inadequately wired homes, furniture arrangement depends, unfortunately, on the location of electrical outlets. As you shift and add furniture and other equipment, you will want to avoid unsightly and unsafe extension cords.

The positioning of the outlets on the sketches is intended to indicate only roughly where outlets may be placed for maximum advantage and convenience. Your special wiring needs will determine how many outlets you will install and where they will be placed.

To be sure you're right, consult step by step with your wiring contractor.

Circuits.—The wiring for the various circuits is not shown in the sketches. This is part of the job to be worked out by the wiring contractor. However, here are some things you should know:

Electricity travels over wires like water flows through a pipe. These paths are called circuits. Each circuit consists of two or three wires. The voltage, or electrical pressure, is similar to water pressure. If the wires are too small for the amount of electricity used, the pressure is greatly reduced.

If Your Farm Is Already Wired

If your buildings are now inadequately wired to meet present or future electrical needs, here is what to do:

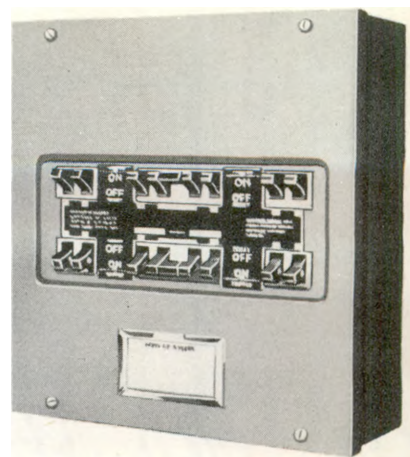
1. Using the information and blank pages provided in this booklet, spot the locations and types of additional outlets you will need.

2. Consult with your wiring contractor on whether your present circuits will stand additional loads, or whether you will need to add additional outlets to your present wiring. The contractor may advise you to plan to install new circuits, reconnecting the outlets to distribute the electrical load equally as far as possible. Where necessary, plan to rearrange present outlets for greater convenience.

It may be possible that your main entrance service is too small for your present or future loads. In that case a new service should be installed. Consult your wiring contractor and co-op wiring advisor on this point.

It's a good idea to paste a small drawing of the building circuits on the load center (your circuit breaker panel or fuse box) so that anyone can tell which circuits are serving each room and each piece of equipment. If you have trouble with lights or equipment you will then be able to locate immediately the circuit that operates them.

Fusing.—Another good thing to know about your electrical service is how circuit breakers and fuses operate. A circuit breaker is a switch made



Certain types of equipment use more electricity than others. If the wires are not large enough to carry the electrical current needed, the voltage may be too low to operate your equipment economically and properly.

That is why it is important, as your electrical contractor will tell you, to have not only the right size and type of wire, but enough circuits to meet all future as well as present needs.

Be sure that you know for what purpose each circuit in your farmstead is to be used.

so that it opens automatically, stopping the flow of current, when more electricity flows through the circuit than the circuit was intended to carry. A fuse is an enclosed device with a piece of soft metal which melts and opens the circuit when the circuit is overloaded.

Fuses and circuit breakers are "safety valves" in your electric systems. They are installed in a box or panel at a central point or points in your home or on your farmstead. If you use too much electricity on the circuit at a given time or if a circuit has "shorted", the fuse or circuit breaker will "blow" or trip, thus preventing overheated wires which lead to fires or damaged equipment.

If a fuse "blows," it will have to be replaced. A circuit breaker, when opened, will have to be reset. If the cause of the overloaded circuit has not been remedied, you will have fusing trouble again immediately.

It is important that you protect your circuits by the right-size fuses and circuit breakers, that will "blow" or trip under given electrical loads. If wrong-size breakers or fuses are used, insulation on the farmstead wiring may be weakened or come off, creating a fire hazard.

For safety, consult with your electrical contractor on the sizes of fuses and circuit breakers needed for the size of wires in each of the circuits in your buildings.

EASY TO READ WIRING SYMBOLS

You'll See Them As
You Read This Book

	Lighting outlet in ceiling used with wall switch control		Switch and single-convenient outlet
	Lighting outlet in ceiling (pull-chain switch control)		Load center or main disconnect
	Lighting outlet in wall (bracket-type fixture)		Waterproof heavy-duty outlet
	Twin receptacle, or convenience outlet		Single-pole snap switch
	Twin receptacle or convenience outlet (polarized and arranged for grounding of appliance frame)		Three-way switch for controlling light from two locations
	Three-pole receptacle or heavy-duty outlet		Four-way switch for controlling from more two locations
	Snap switch with pilot light. (NOTE: Pilot lights are used to indicate that switch is on and lights are burning.)		

FLOOR PLAN

Below is a plan of the first floor of a farmhouse. Notice how the owner has located the various switches and convenience outlets. (Other rooms upstairs follow the same general plan.) As you study your own wiring needs, based on the sketch you have made of your room lay-out, you will be able to indicate on the sketch just how many switches and outlets you will need.

Here are some things to notice in the lay-out below, and in your own wiring lay-out:

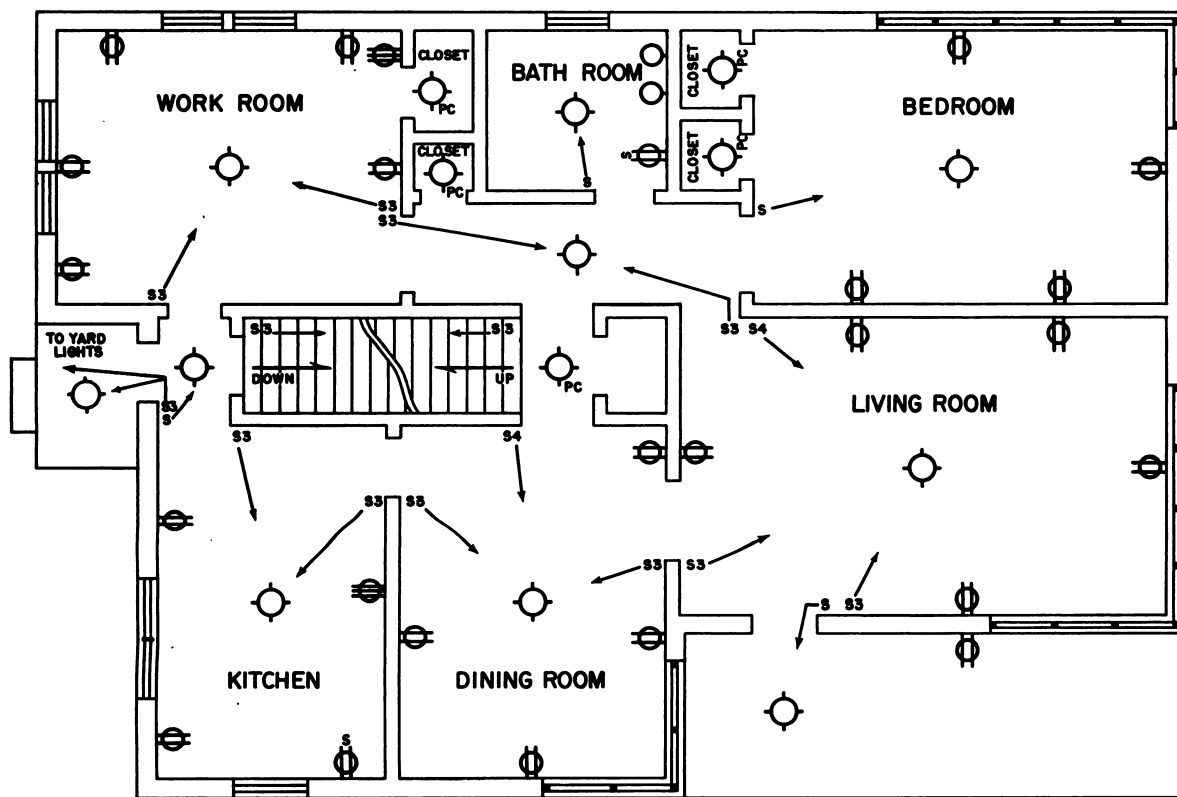
1. There is a three-way switch by every doorway,

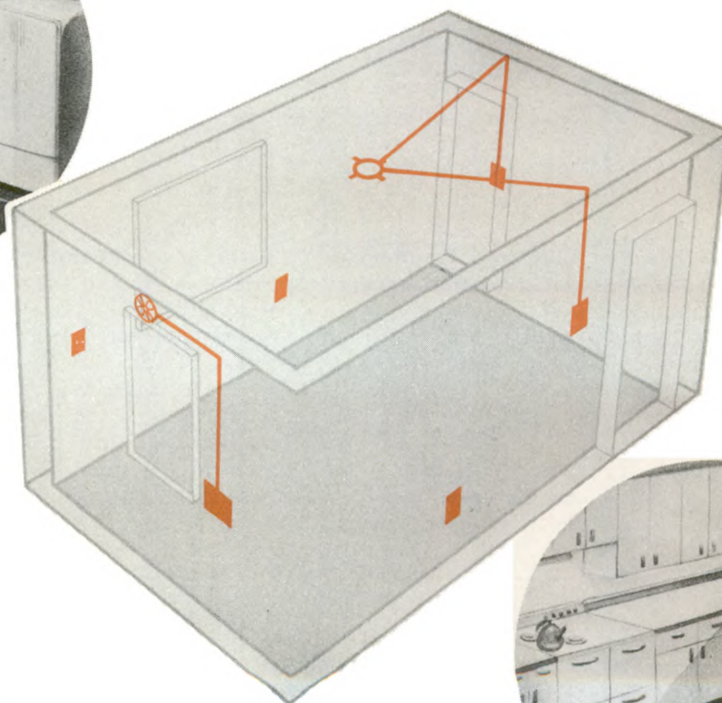
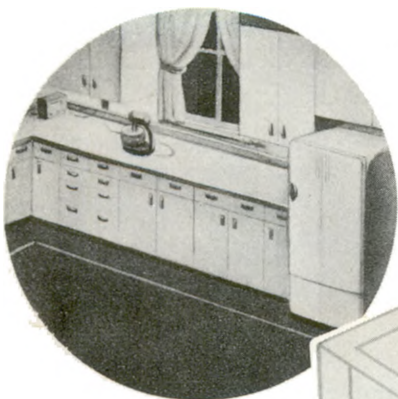
enabling one to turn on the ceiling light as he enters the room, and to turn it off as he leaves.

2. Heavy-duty outlets (240 volts) are provided in the kitchen for the range, and in the workroom for a water heater. (See sketches on following pages.)

3. The three-way switch on the back porch controls the light on the porch and the yard light, so both can be turned on and off for maximum safety and convenience.

4. Each room has convenience outlets for efficient use of electricity.





Kitchen

WHETHER you redesign or rearrange your kitchen to accommodate your new electrical equipment, or fit it into the present lay-out, you'll want your kitchen to be a handy, step-saving room.

First, think of your kitchen as arranged into work centers where you do specific type of work, and plan your equipment into these centers.

The sketches illustrate this: The upper circle shows the food-preparation and storage center, planned around the refrigerator at the right. Notice that there is plenty of cabinet space for storing utensils and supplies, and work space next to the refrigerator for preparing foods.

The lower circle shows the sink and cleaning center to the right, with the cooking and serving center, built around the range, at the left.

This sort of arrangement can simplify your kitchen work.

In the main sketch, notice how the electrical service has been arranged to meet the needs of these work centers. The outlets (panels by the windows) are at table-top height for convenience of plugging in toaster, mixer, coffee maker, and other small appliances. The convenience outlets should be at about every 12 feet of running space.

The panel to the right of the window in the left

wall also contains a switch for the ventilating fan over the window.

The panel in the nearest wall contains the power outlet for the range. The panel in the farthest wall, near the floor, contains the outlet for the refrigerator shown in the circle.

Notice the switches by both doors, controlling the ceiling light. The family won't have to grope in the dark or retrace steps to turn off lights.

Plan for plenty of light in your kitchen. Good

light prevents eye-strain and lessens fatigue; makes your kitchen more efficient and attractive. In addition to a ceiling light fixture for good general lighting (with either an incandescent or fluorescent bulb), you'll need local light over the range, sink, and work counters to prevent working in your own shadow.

Sketches on the opposite page show types of fixtures recommended for general and local lighting in the kitchen.



A. Opal-glass enclosing globe ceiling fixture. May be had in various sizes. For the average kitchen select a 12-inch globe, and use a 150-watt bulb. For the small kitchen use a 10-inch globe with a 100-watt bulb.



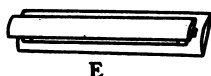
B. A glass-enclosed fluorescent ceiling fixture. Use three 20-watt fluorescent tubes.



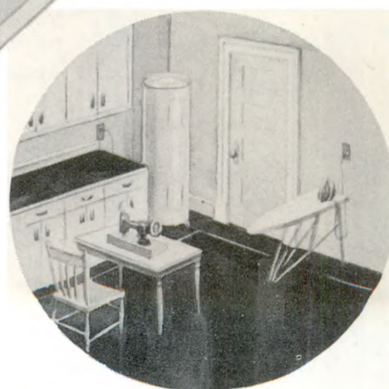
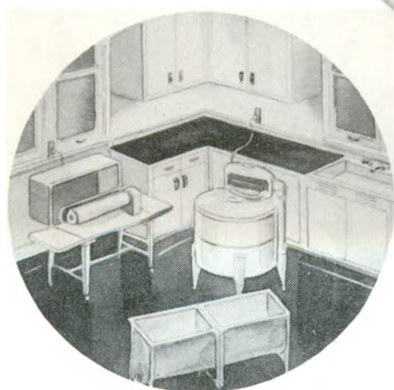
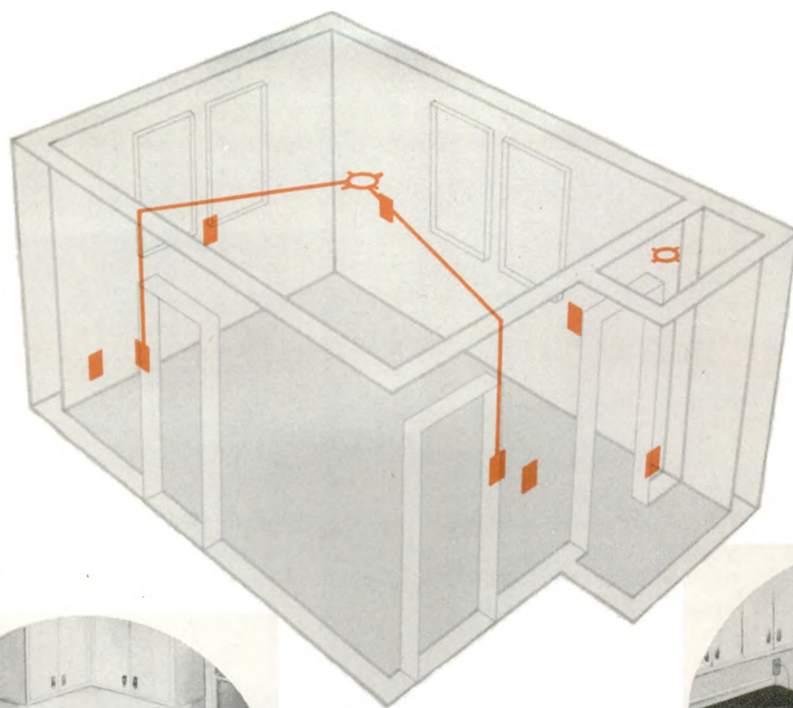
C. Wall bracket with opal-glass shade. For use over sink, range, and work counters where additional light is needed. Use a 40- or 60-watt bulb. Light is controlled by pull chain.



D. Pin-up lamp using a 75- or 100-watt bulb is another means of providing additional light near work counters and range. Simple to install; plugs into convenience outlets. Hang on wall so bottom of shade is about 60 to 62 inches above floor.



E. Fluorescent wall bracket for use over work counters, under cabinets, or over range. Has adjustable shield to protect the eyes from glare. Select in sizes to accommodate 15- or 20-watt fluorescent tubes.



Work Room

NOW THAT you'll be doing the "family wash" the electric way, give careful thought to a convenient place to use your washer, iron, and perhaps an ironer. Take a look at the floor plan on page 5, showing a workroom near the kitchen. Maybe a room of this sort is the answer for your home. It's an ideal place in which to do the laundry, canning, freezing, sewing, and dozens of other home and farm chores without cluttering up your kitchen. It will save you time, trouble, and work.

Wherever you do the laundry, you'll want the outlets located for convenient use of the washer, iron, or ironer. Place them on the wall about 40

inches above the floor to enable you to plug in the equipment easily.

Plan for plenty of good, well-diffused light so you won't be working in your own shadow. (On the next page you'll find sample fixtures suitable for the laundry center and over work tables.) It is important that the fixtures be located so that the light will be directly over the wash tubs and the place where the ironing is done. Daylight bulbs are especially recommended for use in these fixtures because they make it easier to detect spots and stains. You'll find them for use in either fluorescent or standard-type (incandescent) fixtures. Just ask for

daylight bulbs. Correct wattages are listed on the opposite page.

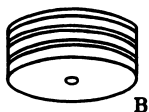
In the room sketch on the opposite page, the orange panels at the doors represent switches controlling the ceiling light. The panel between the windows on the far side of the room, and the panels

on adjoining wall, can be used as outlets for washer and ironer (as shown in the left-hand circle). The outlet panel at waist height on the near wall may be used for the iron (see right circle). The panel near the floor on the same wall is a heavy-duty outlet for the water heater shown in the right-hand circle.

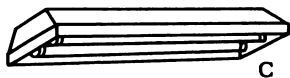
FIXTURES FOR WORKROOM



A. An inexpensive ceiling fixture of opal glass. Either a 10-inch- or 12-inch-diameter globe may be used, depending on size of room. Daylight bulbs are recommended where laundry work is done—use 150-watt daylight bulb in 10-inch globe and 200-watt daylight in 12-inch globe.



B. Close-to-ceiling fixture with 12-inch opal-glass bowl. Particularly well suited for rooms with low ceilings. Has three sockets. Uses 40-watt bulbs. If daylight bulbs are desired, use three 60-watt.



C. Fluorescent fixture with metal reflector. Uses two 20-watt fluorescent daylight tubes. Provides light of excellent quality over washtubs, ironing board, and work tables.

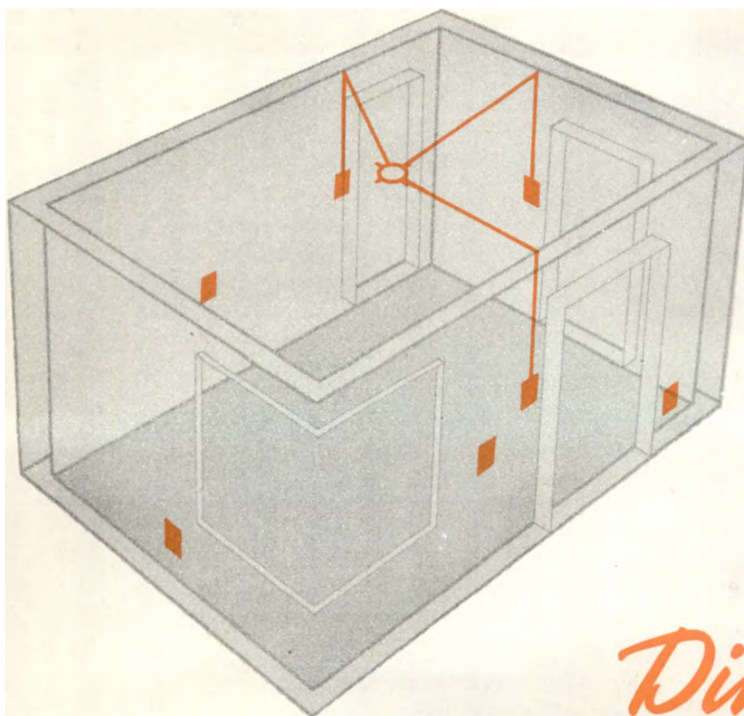


D. Wall bracket with opal-glass shade for use at washtubs, ironer, or work tables. Use 60-watt bulb.



E. The RLM standard dome reflector can also be used where efficient downward light is needed—particularly in basement areas. Use a 100- or 150- watt silvered-bowl bulb to prevent glare of bare bulb striking the eyes. This fixture is made in several sizes by several manufacturers.

NOTE: A, B, and C fixtures are preferable for first-floor workrooms.



Dining Room

PLAN your dining-room outlets for the particular needs and customs of your family. If the dining room doubles as a "family room" for such activities as studying, sewing, playing games, include enough convenience outlets to allow for good use of lamps, radio, fan, and sewing machine.

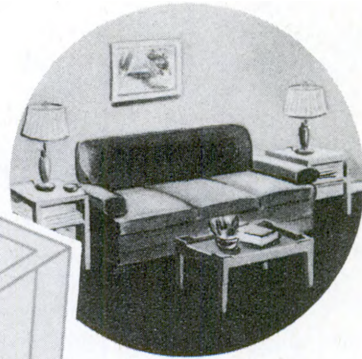
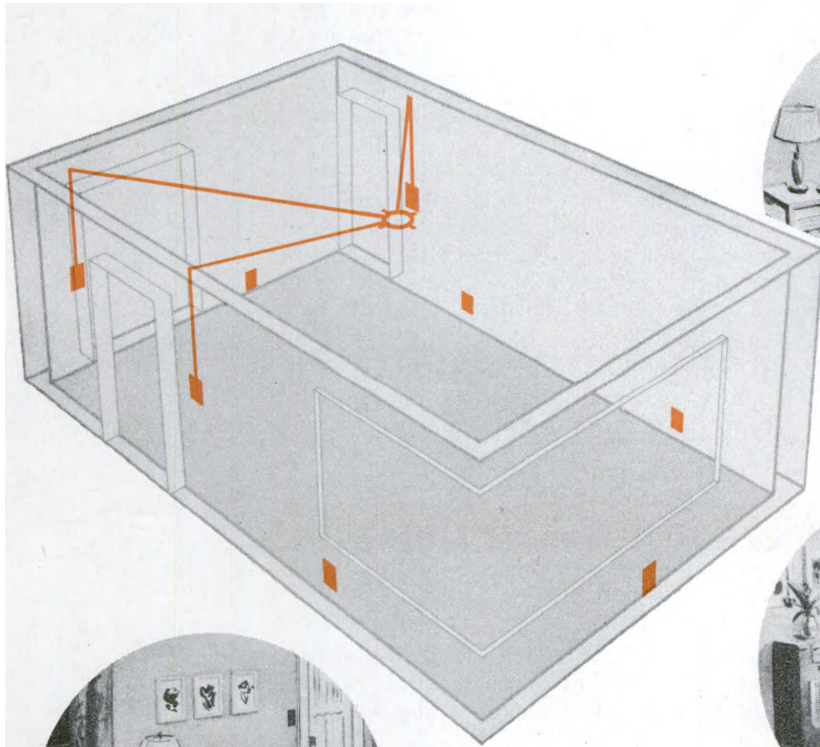
The sketch above shows an adequate supply of outlets near the baseboard for this purpose. You'll also want outlets for appliances such as waffle bakers, coffee makers, and toasters near the table, to avoid the use of long and unsafe extension cords. These outlets should be located on the wall about table height. (Notice the panels on the wall in the circle above.)

Plan for three-way wall switches to control the ceiling fixture from the most used entrances, such as those to your kitchen and living room. (Shown in the sketch above by orange panels near the doors.)

Choose a ceiling fixture that gives a soft, well-diffused light. The bowl-type fixture, which conceals the bulbs, will provide good general lighting for dining. It may be had in a number of designs, a few of which are illustrated below.

If your dining room is used for study or similar activities, choose a fixture of the type shown in sketch B. This has a glass bowl which diffuses the light well, and a deep, wide shade which allows for a good spread of light. The three-light bulb allows a low or moderate amount of light for dining and plenty for reading and study. This fixture should hang about 30 inches above the table.

Wall brackets, as illustrated in D, lend a pleasing decorative note to the dining room. So does the use of fluorescent tubes to light window valances and china cabinets. However, be sure you have good lamps for reading and sewing before investing in this type of decorative lighting.



Living Room

HERE'S the room in which the entire family lives—reads, writes, sews, listens to the radio, rests, talks, entertains, plays music and games. Perhaps you will also use a fan, clock, vacuum cleaner, and occasional small cooking appliances here.

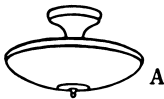
For maximum livability, plan your convenience outlets so that no point along the wall is more than 6 feet from an outlet (6 feet is the usual length of appliance and lamp cords). Remember that you may want to rearrange furniture from one season of the year to another, so place your outlets accordingly. They may be installed in the baseboard or about 18 inches from the floor, as shown in the sketches. You may want to install an outlet in the mantel for the clock.

Notice in the circles that outlets have been pro-

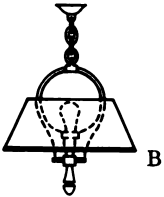
vided for the convenient use of lamps on both sides of the sofa and for use of lamps by the easy chair and on the desk.

Much of your living-room lighting should be from portable lamps of this kind, about which you'll find more information on page 15. For general lighting, use a simple, attractive ceiling fixture of a type that completely shades the light source from the eyes. (Switches to control this fixture are shown at both doors in the sketch.) An inverted-bowl type is more efficient and easier to clean than a cluster-type fixture. It should be light in color, with white, plastic ivory, or opal glassware. The bottom of the fixture should be at least 6½ feet from the floor and it should be about as wide in inches as the room is wide in feet. If the living room is 12 feet wide, choose a fixture at least 12 inches in diameter.

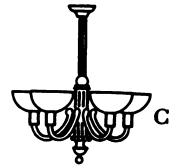
LIGHTING FIXTURES FOR DINING ROOM



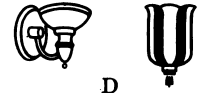
A. Short suspension fixture with bowl of plastic or decorated glass. Single socket—use 100-watt bulb in bowls of 12-inch and 14-inch diameters. For large dining room, select 16-inch bowl and use a 150-watt bulb. This type of fixture fits well into a room with low ceiling.



B. Semi-indirect fixture that provides both general and localized lighting of good quality. Has 10-inch diffusing bowl under shade (similar to floor lamp). Use a three-light bulb of 100, 200, 300 watts. Recommended where dining room is used for study, sewing, and other close-seeing tasks. Similar designs with 8-inch diffusing bowls are available for use in small dining rooms with 50-100-150-watt bulb.



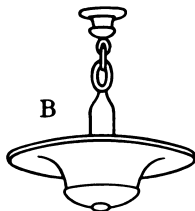
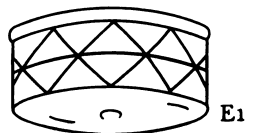
C. Semi-indirect fixture with 6-inch-diameter bowls of translucent glass or plastic. Use 60-watt bulbs. Small bowls of clear glass or with applied color or frosting should be avoided, as they produce a harsh glaring light.



D. Designs of wall brackets used mainly for decorative effect. Shades should be of opal glass, plastic, or parchment, which produce a softer light than shades of crystal or frosted glass.

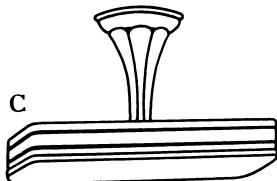


LIGHTING FIXTURES FOR THE LIVING ROOM

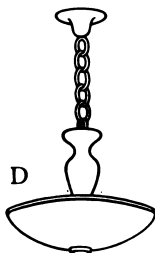


A. Short suspension fixture with bowl of plastic or glass. Diameter 14 inches or 16 inches. May be had with three, four or five sockets using 40- or 60-watt bulbs.

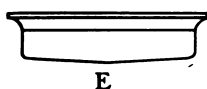
B. Metal bowl with glass bottom plate. Use 100-watt bulb in 14-inch bowl, one 150-watt bulb in 16-inch-diameter bowl.



C. Fluorescent fixture: Used with a glassware or plastic plate of good quality. A fixture with three or four 20-watt tubes is satisfactory for most living rooms.



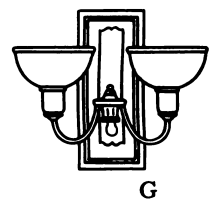
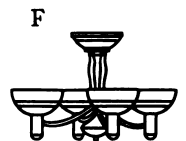
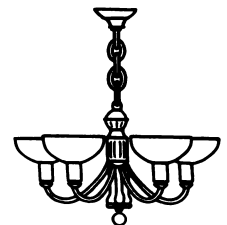
D. For high ceilings: Fixture with long suspension chain. Bowl of plastic, glass, or metal. Diameter 14-inch or 16-inch. May be had with three or five sockets. Use three 60-watt bulbs or five 40-watt bulbs.

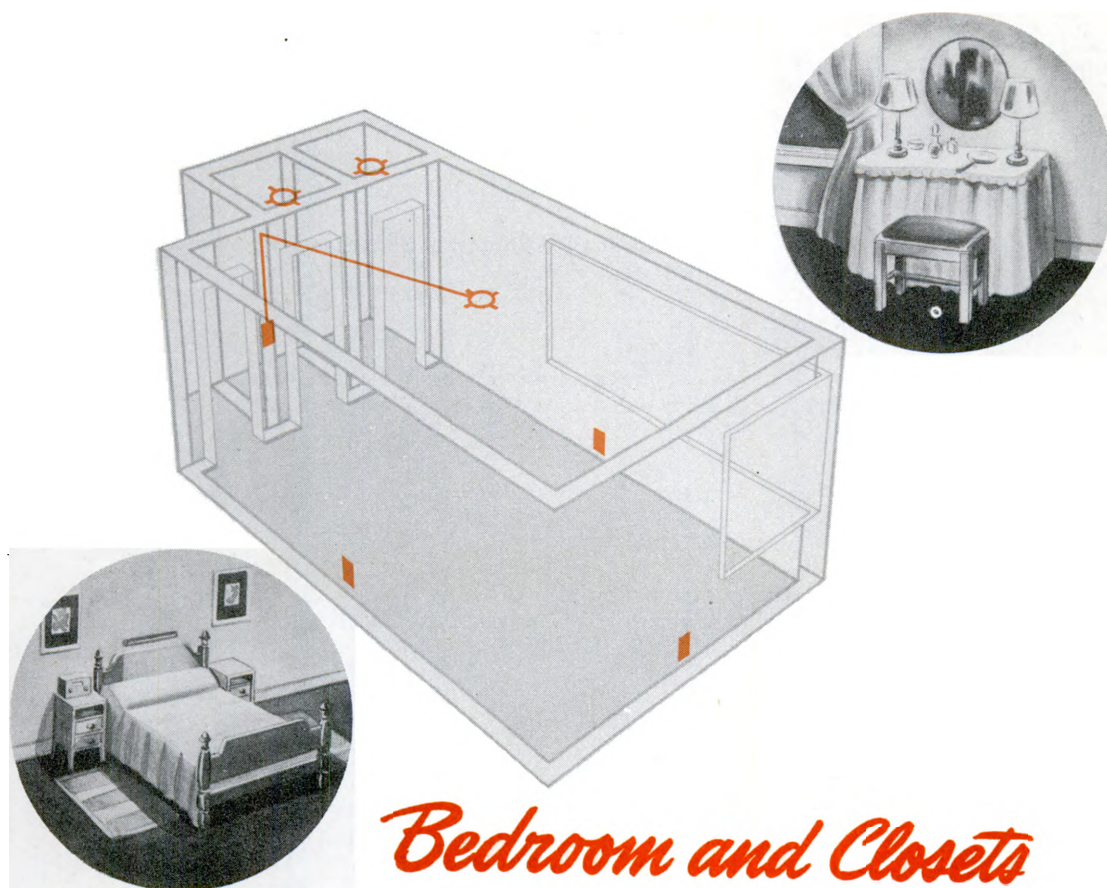


E. For very low ceilings: Shallow-bowl type of fixture of glass in opal white, cream or ivory, 14 inches or 16 inches in diameter. Three, four or five sockets using 40 or 60 watts.

F. Cluster of shallow bowls of translucent glass or plastic in white, cream, or ivory, 6 inches in diameter. Use 40- or 60-watt bulbs.

G. Bracket fixtures of single- or double-arm type. Shades may be opal glass or plastic in white, cream, ivory, or parchment. Use 40-watt bulbs in 3-inch or 4-inch bowl, 60-watt in 6-inch bowl.





Bedroom and Closets

FIRST, plan for a simple ceiling fixture about 12 inches in diameter in every bedroom. Be sure it is of the type which shields the eyes from bulb glare. White, ivory, or opal glass-ware is suitable. A wall switch inside the bedroom door (see panel in above sketch) controls the ceiling light.

Next, be sure you have plenty of convenience outlets in the most used bedrooms for dresser lights, bed lamps, and electric heating pad or portable heater, also a radio, fan, vacuum cleaner, sewing machine, and floor or table lamps. (See panels in the sketch above.)

Don't overlook a light in the closet, unless the closet is shallow and small. Just a bulb will do. Locate it on the ceiling or just above the closet door, and control it by a pull chain or wall switch.

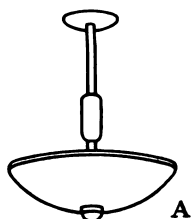
Light for reading in bed can be furnished by two small pin-up lamps (with 75- or 100-watt bulbs) or by a single large pin-up lamp, with a 100- or 150-

watt bulb, centered above the bed, or, as the circle shows, a lumiline or fluorescent type of lamp. A table or floor lamp at one side of the bed also gives excellent light for writing, reading, and sewing. Pin-up lamps should be placed on the wall or bed about 27 inches above the top of the mattress.

For that all-important light at the mirror you can use a pair of dressing-table lamps or two pin-up lamps (notice the use of lamps on the dressing table in the circle). The dressing-table lamps should be tall enough to bring the light up even with your face. Use 60- or 75-watt bulbs and be sure the shades are translucent enough to permit the light to pass through for effective lighting of your face.

Finally, you may want a 7-watt shaded lamp for night lighting in case of illness, or for a child's room. It may be plugged directly into a convenient outlet.

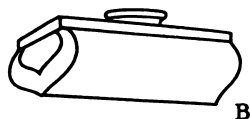
On the next page ceiling fixtures and lamp types are illustrated.



A. For high ceilings, a fixture with a rigid stem or chain support. May be of plastic, glass, or metal combined with plastic or glass. Use three 40- or 60-watt bulbs.

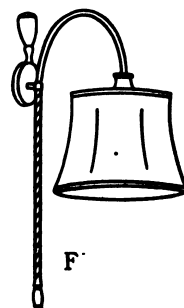
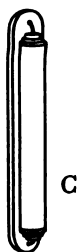
B. Glass or plastic shaded fluorescent fixture using three 15-watt tubes.

C. Fluorescent brackets for mirror lighting. Use 20-watt daylight fluorescent tubes. Place one on each side of mirror.

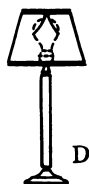
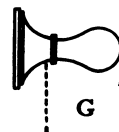


D. Dressing-table lamps, 16 to 22 inches in height. Shade diameter at bottom—8 inches. Shades should be at face height and of translucent white or cream-colored material. Use in pairs placed about 30 inches apart. Use 60-watt bulbs.

E. Pin-up lamp may also be used for good dresser lighting—one on each side of mirror. Shades should be white-lined and translucent to let enough light through. Diffusing bowl unnecessary here. Use 75-watt bulb. Same type pin-to-wall with 6-inch diffusing bowl or larger pin-to-wall lamp with 8-inch diffusing bowl provides good light at bed for reading.

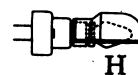


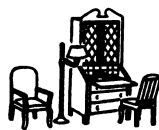
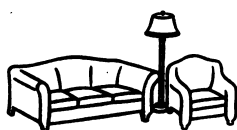
F. Another type pin-up lamp which can be raised or lowered. Adjustable for reading in bed, also good over some mirrors if only one lamp is used. Available in large and small size. Larger sizes with 8-inch diffusing bowl preferable over bed. Use 100-watt bulb in this lamp.



G. Closet light with pull chain. Use 40- or 60-watt bulb.

H. Night light. Use 7-watt bulb. Plug into convenience outlet.





Table, floor, and wall lamps provide the most practical and convenient means of getting adequate light where you need it. Good lighting is so important to the comfort and well-being of your family that special attention should be given to the selection of portable lamps. Remember that eyesight is precious—guard it well.

Every place where reading, sewing, and other close-seeing jobs are done should be illuminated by a good lamp with the proper size bulb. By armchairs, at study tables, by the piano and sewing machine, at each end of the sofa are places that need plenty of light. Here are the requirements of a good reading lamp. Use them as a guide in selecting the right lamp for the right place in your home.

1. The study lamp (or junior-size floor lamp) should be tall enough and with a shade broad enough to spread a wide circle of useful light—allowing one to sit up comfortably while reading. (The chart below will guide you on these points.)

2. Be sure the lamp has a diffusing (reflector) bowl under the shade to reduce glare and soften the light. These bowls should be of good-quality plastic or white diffusing glass of even thickness throughout. (See chart for diameters of bowls and correct bulb sizes.)

3. Choose floor and study lamps designed to use the three-light bulbs which allow for wider selection of lighting needed for various activities.

4. Select shades broad at the bottom, deep enough to conceal the diffusing bowl and with a *white lining* to reflect the light. A white or ivory shade provides about 50 percent more light than a dark one which absorbs light.

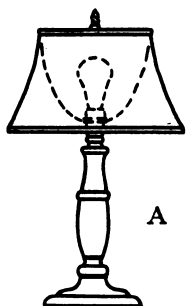
5. Select shades that harmonize one with the other, where two or more lamps are used in the same room.

Placing the Lamp

Study the illustrations on this page for correct placement of lamps. Remember that the correct distance the lamp should be from the eyes for reading and studying is about 14 inches.

Place lamp to the side, to avoid shadows. For right-handed persons, place it to the left; for left-handed ones to the right. With careful grouping one light may serve two or more persons, as shown in the sketch.

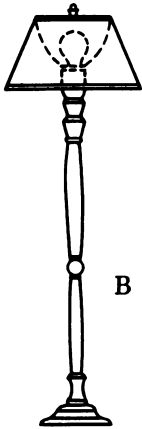
Hang the wall-type or pin-up lamps so the bottom of the shade is not more than 24 inches above the work being done, and slightly to the left when used over a slant-top desk or work table.



- A. Height of lamp—28 inches
 Shade diameter at bottom—28 inches
 Bowl diameters with bulb sizes—
 8-inch bowl—100 watts
 9 $\frac{1}{2}$ -inch bowl—150 watts
 or three-light bulb with 50-100-150 watts

Suggestions for use

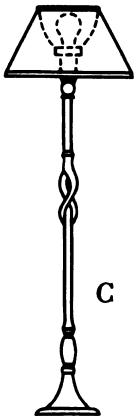
On left side of desks and study tables.
 On table behind sofa; on large end table or beside tables.



- B. Height of lamp—58 to 63 inches
 Shade diameter at bottom—18 to 20 inches
 Bowl diameters with bulb sizes:
 9 $\frac{1}{8}$ inches—150 watts
 10 inches three-light bulb with 100–200–300 watts

Suggestions for use

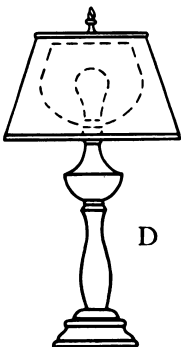
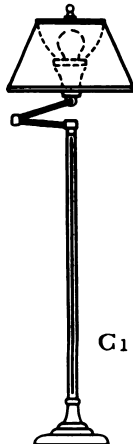
Beside and slightly to the rear of armchairs
 Centered behind the sofa or at piano
 Many styles of this taller floor lamp fit well into rooms with high ceilings.



- C. Height of lamp—58 inches
 Shade diameter—18 inches
 Bowl diameter and size of bulbs:
 8 inches—100 watts
 9 $\frac{1}{8}$ inches—150 watts or three-light bulb of 50–100–150 watts

Suggestions for use

Beside chairs or at desks, by sewing machine, or for other close-seeing jobs
 At the side of bed or at the end of sofa
 The low, or junior-size, floor lamp fits well in rooms with low ceilings or with small-scale furniture. This may be had with swivel arm.

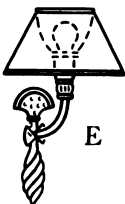


- D. Height of lamp—23 inches
 Shade diameter at bottom—16 inches
 Diameter of bowl and size of bulb:
 7 inches—100-watt

NOTE: The diffusion bowl with curved-in top as sketched is used in end-table lamps to reduce glare from bulbs when one looks across the top of lamp. The top of bowl is 4 inches in diameter.

Suggestions for use

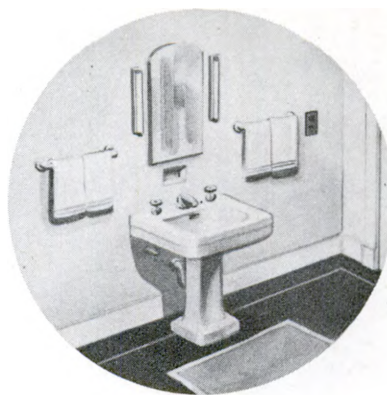
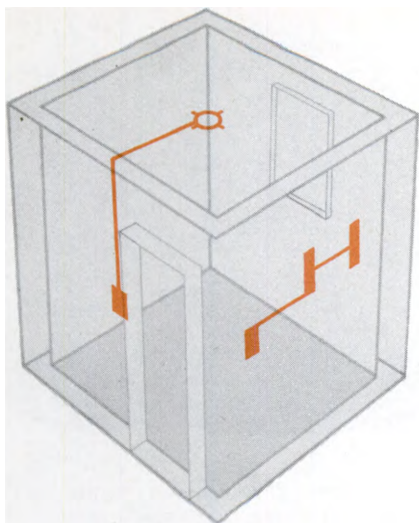
This type of lamp is especially recommended for use on end tables or at sofa.



- E. Shade diameter at bottom—10 to 14 inches
 Bowl diameter with size 4 bulb—8 inches with 100-watt bulb.

Suggestions for use

Over beds, chairs, sofa, work tables, and sewing machines where local light is needed. Wall lamp can often be used to advantage where space does not permit use of other types of lamps.



Bathroom

THE MOST important lighting in the bathroom is that used at the mirror. Placing tubular fixtures at either side of the mirror is an efficient means of providing adequate light (see circle). These lights can best be controlled by switches at the base of the light. For fluorescent fixtures, use 20-watt daylight bulbs.

Wall brackets with opal glass shades, preferably of the upturned type, provide another good means of lighting the mirror. Place these fixtures about 5½ feet above the floor.

In a small room (less than 60 square feet) the mirror lighting can provide the main light in the

room. However, most bathrooms also require a ceiling light for general lighting. The opal-glass enclosing globe is a popular type. (The panel at the door in the sketch controls the ceiling light.)

It is often advisable to install an outlet for the convenient use of an electric razor or portable heater. In the sketch this outlet is shown on the same wall as the mirror, but far enough away from the lavatory so that there is little danger of contact with water.

Below are illustrations of ceiling and wall-fixture types.

LIGHTING FIXTURES FOR THE BATHROOM



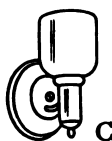
A

A. Opal glass enclosed bowl. May be had in different designs. Provides good lighting at low cost. For 9-inch-diameter bowl use 75-watt bulb. For 10-inch use 100-watt.



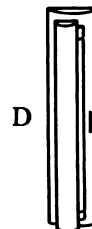
B

B. Shallow glass-bowl fixture fits well in bathrooms with low ceilings. For single-socket type use 75-watt bulb, for two sockets, 60-watt.



C

C. Wall brackets with opal-glass shades for use on each side of the mirror. Use 60-watt bulbs and mount brackets about 66 inches from floor.



D

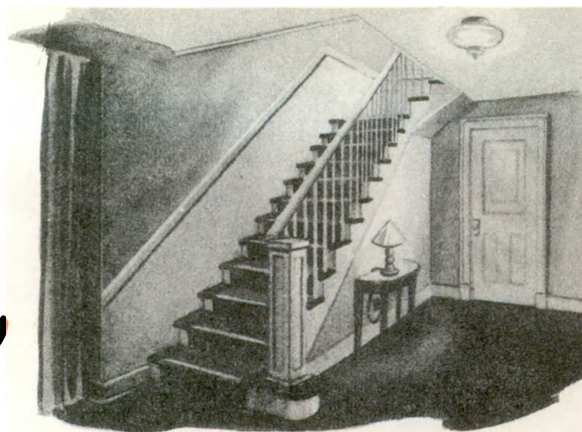
D. Tubular fixtures provide excellent mirror lighting. This type may be used with incandescent lumiline bulbs either 40- or 60-watt; or with 15-watt fluorescent tubes. Both designs have swivel shields.



E

E. Another design of glass-shaded brackets for mirror lighting. Use 15-watt fluorescent tubes.

Entrance Halls and Stairways



THE IMPORTANT thing in lighting the entrance to your home is to have each of the steps leading either to the porch or directly to the door completely lighted and free of shadows. For the porch, a globe-type ceiling fixture should be installed halfway between the doorway and the steps.




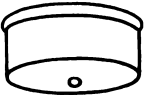

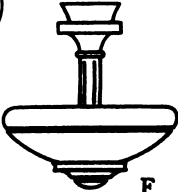
Glass-enclosed globes or lantern-type fixtures may be used on both sides of the door if there is no porch. Another method of lighting the small entrance is to use a globe or lantern-type fixture above the door. The porch light should be controlled by a switch inside the house and perhaps by one in the garage. A weatherproof convenience outlet should be installed on the porch so that equipment may be used there or in the yard.

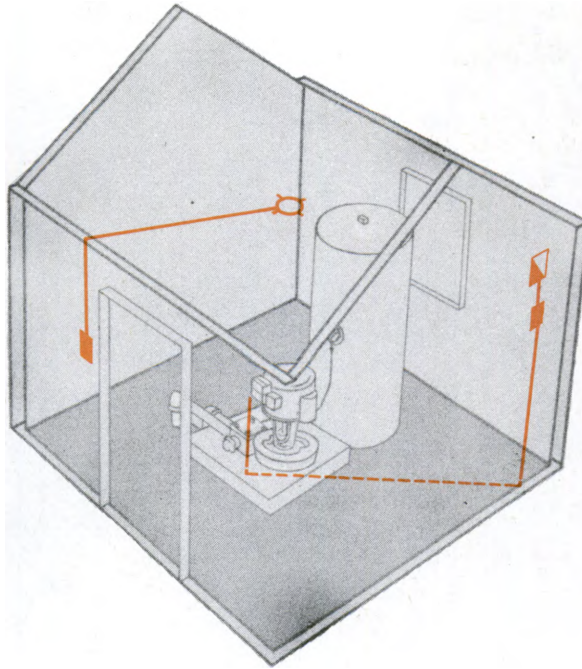
Special attention should be given to *safety* in the lighting of halls and stairways. Plenty of light, free from shadows and glare, should be provided.

This means that there should be no bare bulbs in line of vision to create glare or shadows that might cause a serious accident on the stairs. There should be a ceiling light on each floor to illuminate the top and bottom of stairs. Switches should be installed so that the lights can be turned on or off both upstairs and down.

The ceiling fixture that lights the stairs should usually be centered in the main part of the hall near where the stairs begin. If a hall is long, additional lighting will be needed. Another ceiling fixture should be used for every 15 or 20 feet of hall length. Hall lighting can also be provided by a table or floor lamp. Locate this light so glare from top of lamp will not shine directly in eyes when descending stairs.

On the opposite page, you'll find examples of fixtures recommended for lighting porches, halls, and stairways.

- 
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- 
- A. Close-to-ceiling porch fixture. Select one of opal glass. Use 60-watt bulb.
- B. Suspension-type porch ceiling fixture with panels of opal glass. Use 60-watt bulb.
- C. Lantern-type bracket for use over or at each side of entrance door. Select one with opal frosted glass panels to reduce glare. Use 60-watt bulb.
- 
- 
- 
- D. Close-to-ceiling fixture for use in hallways. Shade of opal glass. Has three sockets. Use 25- to 40-watt bulbs.
- E. Semi-indirect fixture with 12-inch bowl in plastic or opal glass. For use in hallways. Use 75- to 100-watt bulb.
- F. Inexpensive ceiling fixture of opal glass for porches or small hallways. Opal-glass shade 6 inches in diameter. Use 60-watt bulb.



Pump House

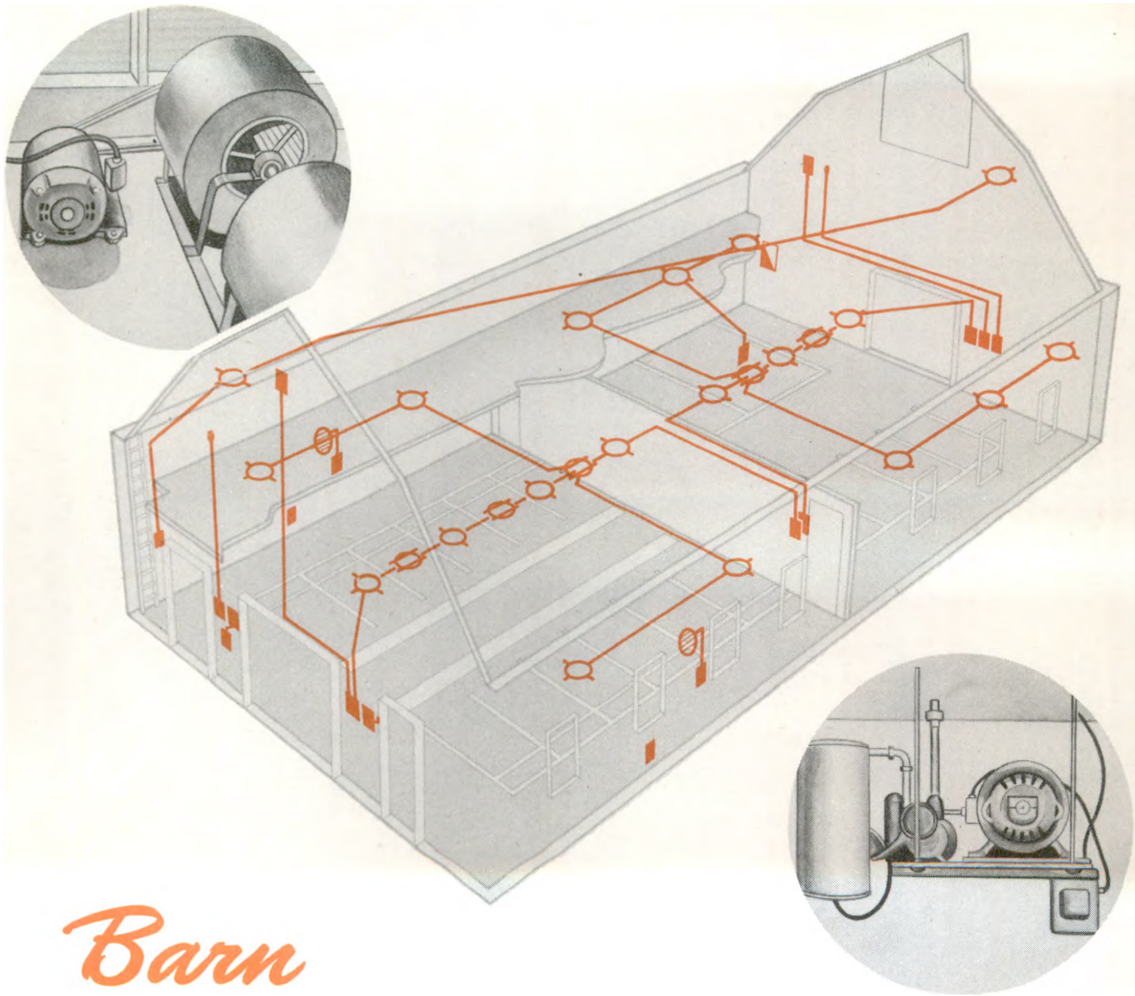
FARM buildings can and should be wired to aid production of livestock and other farm products, and for maximum safety and efficiency. In each building sketch, a service entrance (see legend on page 5) has been indicated.

The above sketch shows wiring of a pump house that may be used to enclose the water pump at the well. The pump, center of the farm water system, must be properly wired for safety and efficient operation. It should be supplied with electricity from the yard pole, so that in case of fire anywhere on the farmstead, power would be continuously avail-

able to operate the pump. It might be necessary to disconnect power to the house or barn in the event of fire.

When $\frac{1}{4}$ -hp. or larger motors are used on the pump, a 240-volt power outlet should be provided. The sketch shows this outlet installed on the right side of the pump house, with the wire placed in conduit pipe on the concrete floor running to the pump. The motor should be grounded for safety.

A wall switch by the door in the sketch controls the overhead light on a separate circuit.



Barn

PLAN barn wiring installations carefully, with a view to the future as well as present requirements. Consider what wiring will be needed for immediate application of electric light and power and for future installations as the electrification of your farm moves forward.

Remember, it is much cheaper to install service wiring adequate for expansion than to replace inadequate wiring and equipment as greater use develops. It pays to look well ahead.

The general-purpose barn of the type shown in the above sketch usually requires wiring for a variety of uses. Special-purpose barns may require only a few uses of electric power. However, certain considerations are basic, no matter what type of barn is to be wired.

Lighting.—Adequate light is essential because of the large amount of time spent in the barn during the

early morning and late evening. Chore time can be reduced and efficiency of workers increased when working areas are properly lighted. Locate ceiling lights carefully for maximum visibility. Locate switches for convenience of control and to avoid extra steps. Equip ceiling lights with shallow reflectors to spread illumination. Outlets for portable lights should be at convenient places to supplement the ceiling lights in special areas when found necessary.

Safety.—This is of paramount importance. Place lights over dark stairways, hay mow ladders and alleyways to prevent accidents. Install vapor-proof fixtures in dusty feed rooms and haymows to prevent dust explosions. Provide suitable guards for switches and fixtures which may be touched by animals or which are subject to mechanical injury. Be sure that all sockets and fixtures

touched by hand are nonmetallic to prevent the possibility of shock and injury, and to prevent their deterioration from ammonia fumes that concentrate in the barn.

Power Outlets.—Power machinery will be increasingly important in the barn to save time and labor, and its source of electricity must be adequate to supply the power needed. All outlets serving $\frac{1}{2}$ -hp. or more should supply 240-volt electric current. If one large motor—such as a 5 hp.—is to operate such machines as your feed grinder, hay drier, ensilage cutter, or other heavy equipment, it is best to use a heavy-duty (portable) power cable (50 to 100 feet long) and move the motor from one location to another on a cart. This eliminates the expense of several large power-outlet installations, and makes the use of power equipment more flexible.

Permanently installed equipment and large motors, even though used intermittently, should have power outlets individually controlled, preferably by magnetic circuit breakers rather than by fuse-type switches. Control panels should be large enough to provide for additional circuits to supply additional equipment as it is obtained.

Grounding.—All circuits, power outlets, and equipment installations should be arranged for grounding and bonding, as required in the standard wiring specifications.

Study the wiring details in the barn sketch and floor plan. Notice that outside lights are provided at each end of the barn. Single switches control these lights, and are placed by the main doors for convenience. (See panels in sketch.) Three-way switches control the light on the yard pole, both from the barn entrance nearest the house and from the kitchen.

Horses and cows in the same barn must be separated by a tight partition to meet requirements for the sale of milk. This makes it necessary to provide control for the lights on opposite sides of the partition separately.

The use of three-way switches permits each group

of lights to be controlled at either door in the partition, without the necessity of going to the opposite ends of the barn, or by the switches at the main doors.

All light outlets except those in the haymow are of the pull-chain type to permit individual control when desirable. The haymow lights are controlled by a switch at the haymow ladder. This is a safety precaution to prevent a fall or injury when entering or leaving the mow. The mow lights, of vapor-proof type, are located near the roof on diagonally opposite corners of the mow.

A switch to the silo light is placed by the door to the silo.

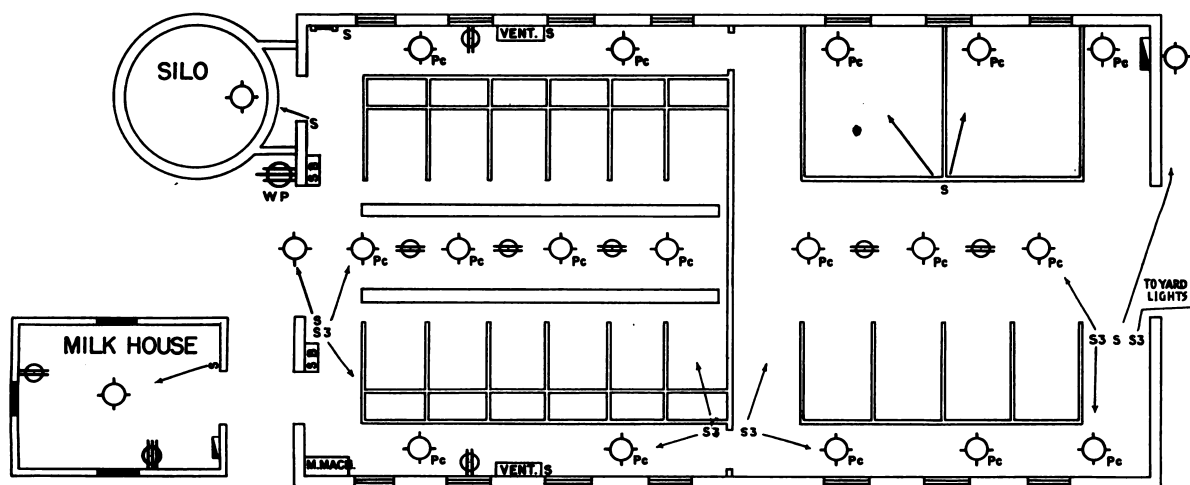
The switch by the box stalls back of the animals permits control of lights without entering the stalls. This is for safety in case the bull, a heifer with her first calf, a stallion or other dangerous animal is kept in a box stall.

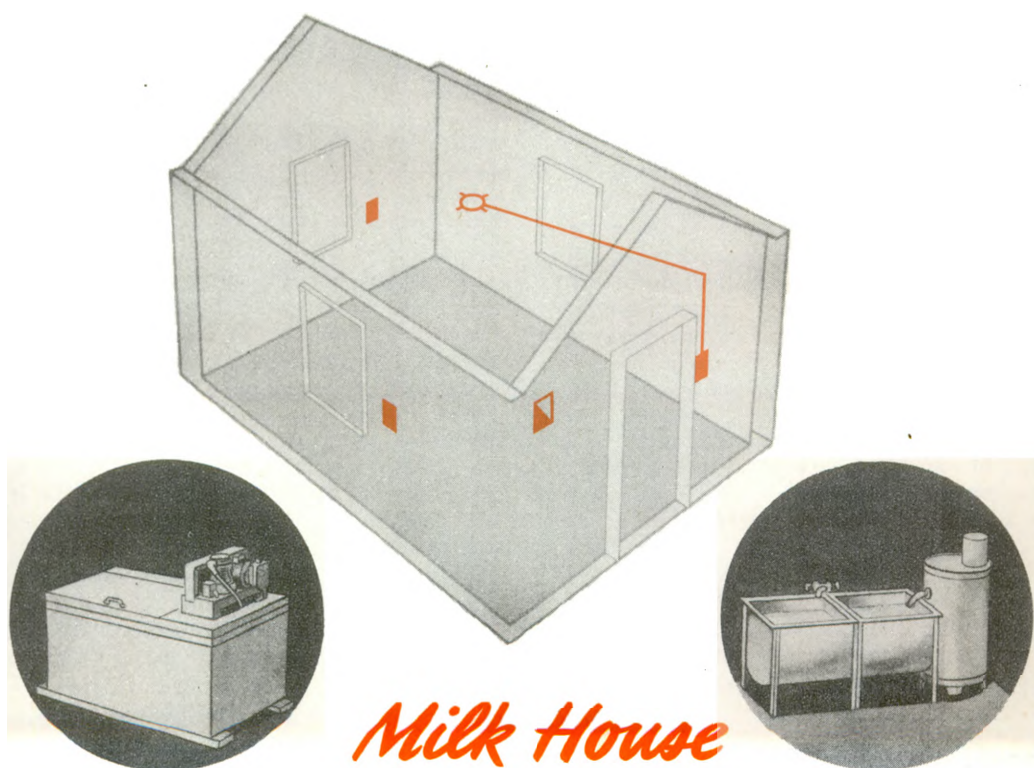
Convenience outlets in the ceiling in the center of the barn and along the sides are for use of clippers, spray equipment, a portable milker or other small devices. The ventilator fans have individual outlets for power supply.

The milking machine may be of the permanent installation suction pipe type. A switch box with magnetic circuit breaker protection for controlling the milking machine is located near the main door.

A similar switch box on the opposite side of the door controls the heavy duty power outlet just outside the barn. This outlet is used to supply a portable 5 to 7½ horsepower motor for use in filling the silo, grinding feed, blowing air through the hay drier, and other power duties. A power cable 50 to 100 feet in length will supply power to the motor from the outlet, wherever such power is needed throughout the barn.

The circle at upper left shows a 5-horsepower single-phase motor driving a double unit multi-vane type blower used with a hay drier. The vacuum pump shown in the circle at lower right operates the milker units.





CLEANLINESS is the main consideration in the milk room or milk house. Plenty of light is needed for adequate cleaning of utensils and equipment. At least one ceiling light enclosed in a ceiling fixture of easily washed, milk-white glass should be provided. Lighting should be controlled by a wall switch, indicated in the sketch by the panel at the right of the door.

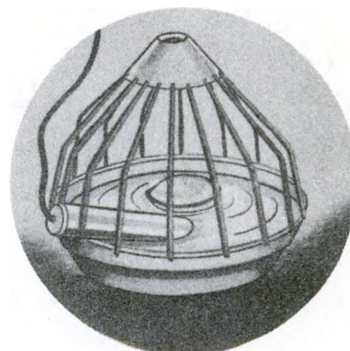
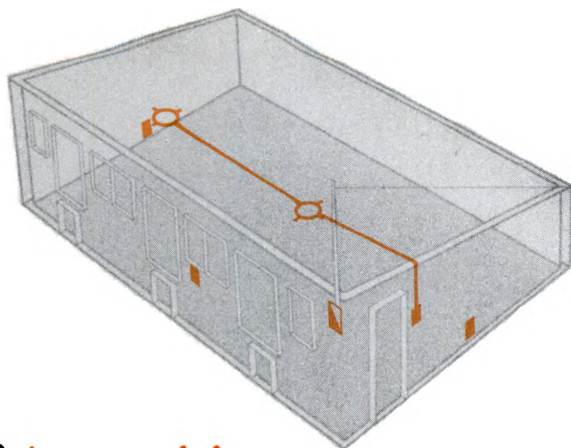
Two watts per square foot of room area is recommended in determining the size of lamps used. For instance, a room 10 feet by 10 feet equals 100 square feet; 100 times 2 watts equals 200 watts. Therefore, one 200-watt bulb, or two 100-watt bulbs should be provided.

In addition to and separate from the lighting circuit should be adequate heavy-duty power outlets for the connection of milk cooler, water heater,

pasteurizer, sterilizer, and other electrical appliances. In the sketch, the panels on the walls near the windows indicate outlets that may be used for this purpose.

Frames of all electric equipment should be properly grounded to protect dairy workers. Grounding is an essential part of milkhous wiring because much work is done with wet hands or on damp floors, increasing the possibility of shock. The wiring inspector will make sure that all the above rules are strictly complied with for safety.

The milk house shown is located at the end of the barn for convenience. Other types of barns could have the milk house placed at the side of the barn near the center.



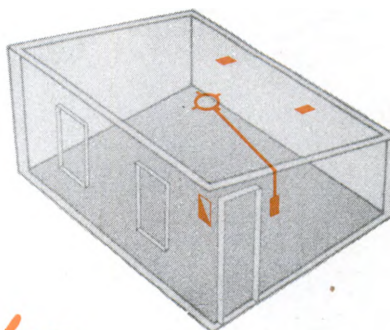
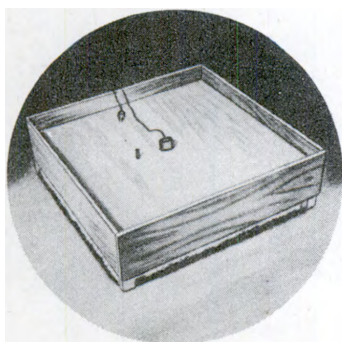
Hen House

GOOD lighting should be provided to afford longer feeding and watering time in the fall and winter for laying hens. Evening and morning lighting requires more light per square foot than all-night lighting. Use one well-shaded 40-watt lamp for each 200 square feet of floor area for evening and morning lighting. Use 15-watt lamps for each 200 square feet in all-night lighting but place the lamps over the feed and water hoppers. Reflectors should prevent light from reaching the roost. Dual circuits to provide dimming to get

birds on the roosts are necessary for evening lighting. Dimming to 10-watts per 200 square feet will aid roosting. The lighting-circuit switches may be manually or time-switch controlled.

Outlets on a separate circuit should be provided for water warmers in the laying house. Outlets for this purpose are indicated near the floor in the sketch.

If the main yard light does not provide suitable lighting outside of poultry houses, plan for additional yard lighting in this area.

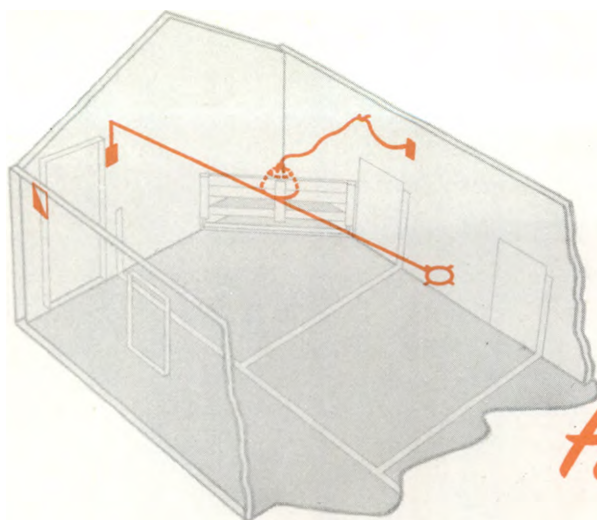


Brooder

LIGHTING should be arranged to afford movement of chicks about the brooding space for watering and feeding both day and night.

Each brooder should have a separate receptacle outlet and separate circuit for most efficient operation. However, two medium-sized brooders (750-watts maximum) may be connected from one duplex receptacle if desired. Often a pilot light on the

brooder circuit or a warning signal when main current supply is off will prove helpful. A water warmer and brooder may be attached to the same receptacle outlet. The sketch shows convenience outlets in the roof or upper beams of the brooder house. This places the extension cord to the brooder in an out-of-the-way place where it will be kept clean.



Hog House

AT LEAST one light is desirable for general illumination in the hog house, controlled by a switch at the door. In stationary multiple-type farrowing houses, each pair of brooders, or one brooder and one water warmer should be provided with a convenience outlet. Proper grounding should be provided for all equipment. A-frame or other small portable types of hog houses may use a single

light with reflector that will supply both illumination and heat for brooding.

The sketch shows a part of a community-type hog house, with the brooder in place in a corner of one of the pens. An outlet is indicated by the panel on the wall. This location keeps the extension cord up away from the pigs and prevents them from chewing it or jerking it out of the outlet.

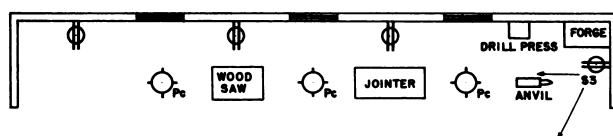
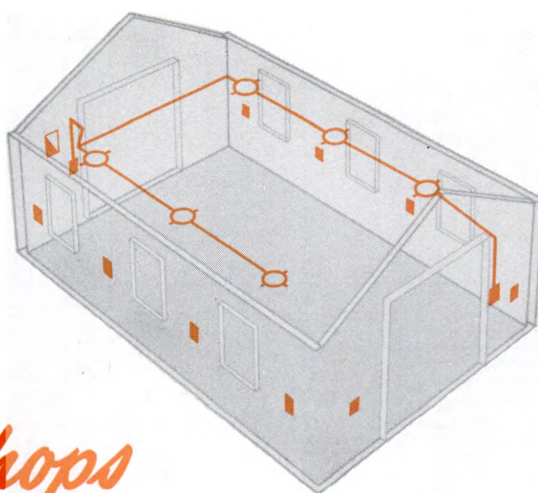


Yard Lights

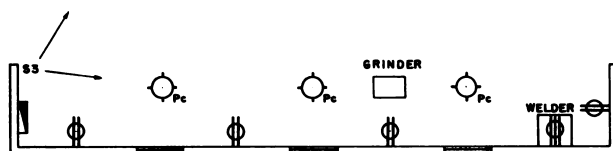
CAREFULLY planned, well-placed yard lights will be needed in the farmyard to permit working efficiently and safely after dark and in the early morning hours. This lighting may be on a yard pole, or it may be on the barn or other outbuilding high enough to provide wide illumination. The lamp should be at least 100-watt to 200-watt size with a very shallow weatherproof reflector unit to spread the rays. The yard light should be controlled by three-way switches located at both house and barn, so that the light can be turned on or off at either place.

The yard light shown in the sketch is controlled by three-way switches. One is located at the house on the porch and the other on the inside of the barn, by the door.

Farm Shops



FARM SHOPS



THE ELECTRICAL farm repair shop is becoming an essential part of modern farm planning and operation. Power applications in the electrified shop requires both 120-volt and 240-volt current. All motors larger than $\frac{1}{2}$ horsepower and the transformer-type welder should be operated on 240-volt current. The main load center (see sketch) should be large enough to provide separate circuits and controls for each large motor, and especially for the welder.

Adequate lighting, much of it concentrated, is required for safe and efficient work at night or on dark days. When repairing machinery, ordinary lighting from permanent fixtures may not be sufficient. Trouble or flood lights on long extension cords should be provided for such conditions.

Power equipment should have the control switch provided for locking in the "Off" position, to keep

children and others from possible injury by operating it without permission.

The sketch and floor plan show a typical lay-out for a farm shop, designed for efficient repair of equipment and for both metalwork and woodwork.

The shop is designed to accommodate large field equipment, such as tractors and combines. Outlets should be spaced every 6 to 8 feet along both side walls as shown in the sketch. The drill press and the anvil are near the forge for metalworking. The welder is served by a power outlet supplied with 240 volts.

Overhead lights controlled by three-way switches at each door or individually by pull chains, supply adequate light. Each light should be fitted with shallow reflectors for spreading and directing the light most effectively.

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